

9 An exploration of the use of mobile applications to support the learning of Chinese characters employed by students of Chinese as a foreign language

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Abstract

At present, there are few studies which explore the learning strategies employed by students of Chinese as a Foreign Language (CFL) and even fewer that focus specifically on mobile application use. This study provides insights into how adult learners at varying levels of proficiency employ mobile apps to support their Chinese character learning. Data were collected from a survey completed by 140 learners and semi-structured interviews with eight subjects. The findings demonstrate that most of the participants are using mobile apps to support their character learning. The most widely used mobile app is Pleco, but only a small proportion of its functionality is exploited. The most frequently used app-based strategies include looking up example sentences that contain new words and viewing stroke orders. The study suggests that students recognise the value of mobile apps in their learning but may need training in how to exploit their full potential.

Keywords: Chinese character learning, vocabulary learning strategies, mobile applications, Chinese as a foreign language.

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1. Introduction

With the rise of the Chinese economy and China's increasing political and cultural influence, there has been a growing interest in learning CFL. The value of learning Chinese and its culture is now recognised by organisations such as the British Council in the UK (British Council, 2013), and this is demonstrated by the sharp increase in the number of CFL learners over the last ten years (Hanban, 2013).

1.1. The challenges for learners of CFL

Learning to read and write is usually perceived as the most challenging aspect of learning CFL, particularly for those students whose first language has an alphabetic system (Hu, 2010). Chinese has a logographic writing system in which each symbol (character) represents an idea and has little correspondence to its pronunciation (Sung & Wu, 2011). To be able to read a newspaper in Chinese, it is estimated that one needs to be able to recognise approximately 3,000 characters (Sung, 2012) which presents an enormous challenge to CFL learners. As Sung and Wu (2011) point out, becoming fully literate in Chinese, that is, knowing how to pronounce, recognise, produce, and understand the meanings of commonly used characters, requires a considerable amount of effort for CFL learners whose first language has an alphabetic system. Thus, most learners spend much of their study time focusing on character learning, and as the character is the basic unit of vocabulary, this can be classified as vocabulary learning.

1.2. Second language vocabulary learning strategy research

Learners' use of Language Learning Strategies (LLSs) has long been recognised as significant in understanding the relative success of language learners (Oxford, 1990), and the findings of research in this area have guided language educators in helping learners become more effective. Schmitt (1997), building on this work and his own research on vocabulary learning and teaching, developed a taxonomy of Vocabulary Learning Strategies (VLSs). However, this taxonomy,

like Oxford's (1990), is based mainly on research of learners of English as a second language. It therefore reflects both the alphabetic writing system of English and English morphology, and as such, is limited in its transferability to the CFL context. Similarly, much of the research investigating LLSs and VLSs may not be relevant for CFL teachers and learners due to the nature of the Chinese writing system, mentioned in the following section. For example, learning a new word in Chinese involves knowing the shape and stroke order of the character(s), and knowing the pronunciation, including the tone.

1.3. Research on CFL learner strategies

The increase in CFL teaching and learning has led to a recognition of this gap and studies have begun to appear which have explored strategy use by CFL learners. Two of the earliest studies were conducted in the US University context (Shen, 2005; Wang, 1998) and a more recent study has been conducted with adolescent learners in a UK secondary school (Grenfell & Harris, 2015). The findings of all these studies seem to suggest that most learners rely heavily on mechanical repetition strategies such as writing out characters repeatedly with the correct stroke order and self-testing by writing out characters from memory (Shen, 2005; Wang, 1998). As Grenfell and Harris (2015) point out, the effort in doing this can “leave little cognitive space for the deployment of time-consuming but higher level strategies” (p. 1) such as association, where learners try to make connections with previously learned words (Schmitt, 1997).

1.4. Mobile apps and VLSs

Given the challenges of character learning, more research is needed into what strategies might help learners become more efficient. In their review of research on second language learners' vocabulary strategies, Nyikos and Macaro (2007) note that the only real advantage of electronic dictionaries over conventional dictionaries is speed and efficiency, but for most CFL learners, this is a major understatement; electronic dictionaries with handwriting input tools significantly reduce the time it takes to look up an unknown character compared with the conventional approach. A study by Levy and Steel (2015) of language learners

in an Australian university found that electronic dictionary use plays a very important role for learners' daily learning. As [Godwin-Jones \(2011\)](#) notes, such dictionaries and other language learning tools are now widely available as apps on mobile devices. For CFL learners, mobile apps may not only increase efficiency in learning, but may also provide more opportunities for engagement with the target language, particularly in regular short study bursts and during "dead time" ([Rosell-Aguilar & Kan, 2015](#), p. 29). Although there has been a proliferation of research on Mobile Assisted Language Learning (MALL) over the last two decades ([Burston, 2015](#)), there have been relatively few studies of apps to support CFL learning. This paper therefore attempts to address this gap by attempting to answer the following research questions:

- What mobile apps are used by CFL learners to learn Chinese characters?
- How do CFL learners use mobile apps to learn Chinese characters?

The findings reported in this paper are part of a larger study into strategy use in general for character learning and how that might change with experience and proficiency.

2. Methodology

To explore both the use of learning strategies and mobile applications, the study adopted a mixed-methods research design. Quantitative data were collected via a survey and then qualitative data were collected through interviews with CFL learners. The questionnaire was designed to identify the apps most commonly used by learners to support their character learning strategies. The interviews were designed to gain a more detailed picture of how learners made use of apps in their learning context. Both the survey and interviews were conducted in English.

As the study was exploratory in nature with the aim of gaining initial insights into learners' usage of mobile apps, a convenience sampling strategy was

adopted for the survey. The authors used their networks to identify CFL learners to take part in the interviews. Care was taken to achieve a sample which included students with a range of proficiency levels and different types of learning experience.

The questionnaire was divided into two main sections: the first section aimed to collect background information such as learner proficiency and experience; the second focused on learners' use of apps for character learning. Students were asked to select all the character learning strategies they employed with apps from a list of ten provided (shown in [Table 1](#)), and to indicate which app(s) were used for a specific strategy. Six of these items were based on [Shen's \(2005\)](#) strategy inventory, and a further four strategies were added based on the authors' knowledge and experience of commonly used apps.

Xi'an Jiaotong University in China has a School of International Education with more than 800 CFL learners. With the assistance of the authors' professional contacts, CFL students at this School were invited to participate in the survey. Hard copies of the questionnaire were distributed to CFL learners with a range of proficiency levels. The completed questionnaires were scanned and returned by the contact via e-mail. A total of 132 completed questionnaires were returned. In addition, a further eight surveys were completed by students who had also agreed to participate in the interviews (as described below). The data was coded, input into Excel, and analysed. The survey respondents were classified into three proficiency levels: beginners (CEFR³ A1-A2) (35%, N=49), intermediate (CEFR B1-B2) (42%, N=52), and advanced (CEFR C1 to C2) (23%, N=32). This was based on the approximate number of characters that respondents reported being able to recognise, which was then linked to the Hanyu Shuiping Kaoshi (HSK) Chinese proficiency examination and the current [Hanban \(2014\)](#) benchmarks with the CEFR.

Invitations to take part in the interviews were e-mailed to authors' professional contacts who had studied or were currently studying Chinese. The e-mail

3. Common European Framework of Reference for languages

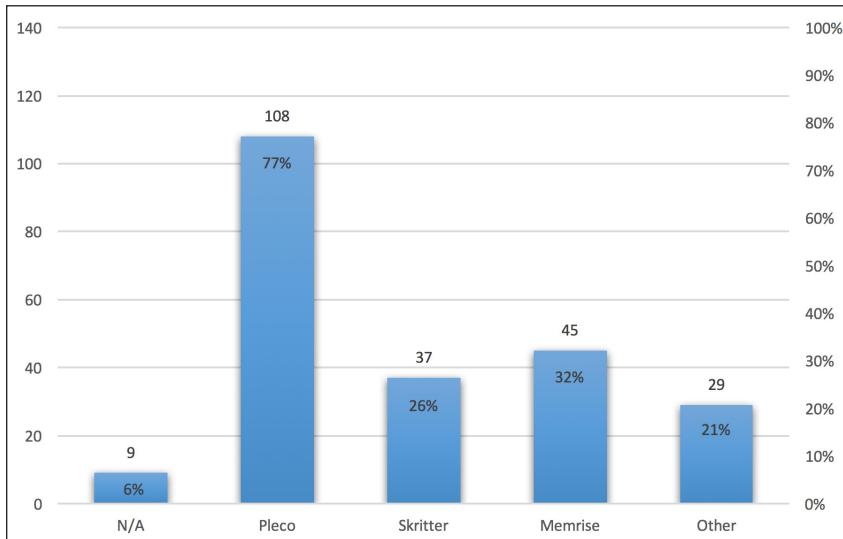
contained information about the purpose of the research and what it would entail. Those who agreed to take part were asked to sign a consent form giving their permission for the interview to be recorded.

Between May 2016 and October 2016, eight interviews were conducted either face-to-face or online via Skype and recorded using a digital voice recorder. The interviewees were asked to share their learning experience in general, describe their overall approach to learning characters, and if and how they used apps. The interviews lasted approximately 40 minutes. Interview participants included two beginner learners, four intermediate learners, and two advanced learners. Participants' levels were categorised according to their self-reports (including estimated number of characters known), experience, and any previous performance in examinations. Five of the subjects had studied or were studying Chinese as part of an undergraduate programme, two were studying Chinese for its relevance to their profession, and one was studying Chinese for personal reasons. The gender of interviewees was split equally: four males and four females.

3. Results

Nearly all (94%) of the survey respondents ($N=131$) indicated that they used mobile apps to support their character learning and 41% of respondents ($N=57$) used two or more. [Figure 1](#) shows which apps learners reported using, with Pleco, an electronic dictionary, being the most popular app among respondents with 77% ($N=108$) using it. Most interviewees (7 out of 8) also used Pleco and it was clear that for those who had spent time studying in China, it had been an indispensable tool, or as one interviewee had described it: her 'friend'. Memrise and Skritter also appeared to be quite popular with 31% ($N=45$) and 25% ($N=37$) of survey respondents indicating that they employed it. Memrise offers a range of language and other courses which include ready-made flashcards with 'mems' (mnemonics) designed to help learners connect new information with what they already know. Skritter is also a flashcard tool but is specifically designed for Chinese and focuses on the writing of characters.

Figure 1. Mobile apps used for character learning



In the ‘other’ option, respondents listed a variety of other Chinese learning mobile apps and online resources, such as TrainChinese: Dictionary & Flash Cards, Hanping Chinese Dictionary for Android device, Youdao Translation, and Learn Chinese: Online Mandarin Course & Baidu Online Translation. When prompted, interviewees also mentioned the app Decipher, and online resources including Arch Chinese, Write Chinese, and Yellowbridge.

When asked to estimate what proportion of their character learning time was spent on apps, 58% of students (N=81) reported spending around 30 to 50% of their character learning time on mobile apps and nearly 10% (N=13) of students reported spending over 70% of their character learning time on mobile apps.

The strategies supported by apps which were employed by respondents are summarised in [Table 1](#). The table also shows the apps students used for each strategy, with some students reporting the use of more than one app to support a particular strategy. The most commonly used mobile app-based strategies are ‘viewing the stroke order of the character’ and ‘looking up words and sentences

that contain the characters'. When the levels of learners are considered, results indicate that lower level learners most frequently used apps to identify components and listen to pronunciation while intermediate and advanced learners more frequently used apps to help them memorise new characters and to associate with previously learnt characters.

Table 1. Mobile app based Chinese character learning strategies

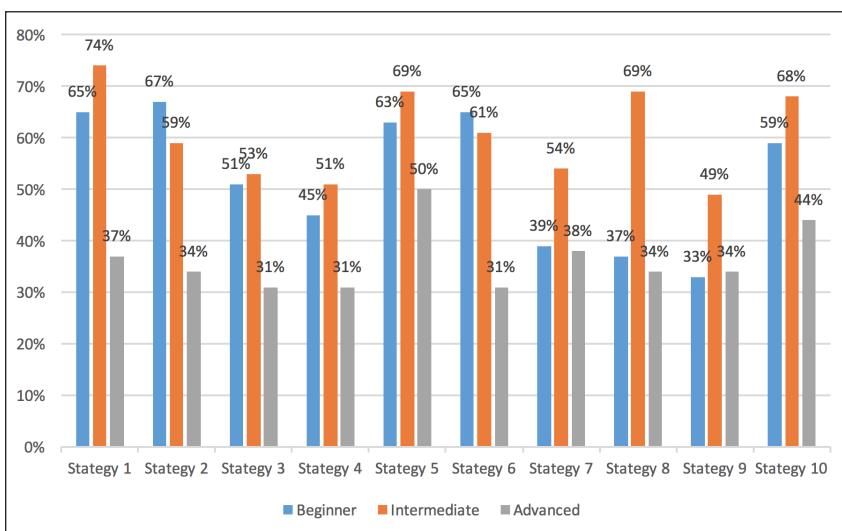
Strategy	App(s) used	% Users	N=140
1 *I use an animation app to view the stroke order of the character.	Pleco, Skritter, Memrise, other	62%	88
2 *I use an app to identify the components/radicals of the character.	Pleco, Skritter, Memrise	56%	79
3 *I use an animation app to trace over the stroke order of the character.	Pleco, Skritter, Memrise	47%	66
4 I use an app to provide me with 'mems' - ways of memorising a character.	Pleco, Skritter, Memrise, other	44%	62
5 I use a dictionary app to look up words and sentences that contain the characters.	Pleco, Memrise	62%	88
6 I use an app to listen to the pronunciation of the words or characters.	Pleco, Skritter	55%	78
7 *I use an app to make flashcards with the character on one side and pinyin and the meaning on the other.	Pleco, Memrise, other	44%	63
8 *I use an app to keep a record of new characters and words.	Pleco, Memrise	50%	70
9 *I use an app to place the new word in a group with other words that are similar in some way.	Pleco, Memrise, other	39%	56
10 I check characters in an on-line dictionary or app for other meanings.	Pleco, Skritter, Memrise, other	58%	83

* indicates strategies adapted from [Shen \(2005\)](#)

[Figure 2](#) shows the app-supported strategies when respondents were categorised according to level. The most popular strategies among lower level learners are to identify components (65%, N=32) and listen to pronunciation (61%,

N=30). Identifying components was also the most popular among intermediate learners (74%, N=44), while for advanced learners, the most popular app-based strategy was looking up words and sentences that contain the character (50%, N=16).

Figure 2. The use of app-based strategies according to proficiency level



The reliability of the survey findings in relation to the apps used for a specific strategy must be considered with caution, since some of the apps do not always have the functionality learners ostensibly associated with them. The interview data did, however, support the general finding in relation to the most commonly used app-supported strategies.

A further limitation of the survey was that there was no 'other' option for students to reveal potential additional strategies. The interview data demonstrated that some of the strategies borrowed and then adapted from [Shen \(2005\)](#) do not reflect the potential complexity of strategy use when applied to apps. For example, the phrase 'viewing the stroke order' can involve a cluster of strategies when using an app. Learners can initially view the stroke order animation to determine or

check the correct order. Subsequent viewings of the animation could also be used as a form of mechanical rehearsal either by simply watching the animation while trying to memorise the correct sequence or by following the animation and copying it using a finger in the air. One learner reported that counting the strokes during the playing of the animation might help him to recall how to write the character later.

In terms of functionality, the survey findings demonstrated that nearly 40% of respondents were using a lot of functions that apps provide. However, 45% of respondents only used one or two functions of the apps, such as using as an e-dictionary to look up meaning and sentence examples. The interview data provided further insights into this issue. Many of the interview subjects, despite the fact that they were users of Pleco, were not aware of many of its functions such as the etymology function, flashcards, stroke order animation or the Clipboard Reader.

4. Discussion

This section discusses the findings in relation to the two research questions.

- What mobile apps are used by CFL learners to learn Chinese characters?

In answering the first research question, the findings show that most students in this study are using at least one mobile app to support their character learning and that most report using them for a significant amount of their character study time. This adds further evidence to the claim that students believe learning with mobile devices can help in the learning of Chinese characters (Rosell-Aguilar & Kan, 2015). A range of different apps as well as online tools were used by students, but the electronic dictionary Pleco was the most popular. Although for many students this was their single app of choice, a large proportion of students were using a range of different digital resources. This is interesting when other studies have shown that some language learners rely on one app as their sole resource for their study (Rosell-Aguilar, 2016).

- How do CFL learners use mobile apps to learn Chinese characters?

Although there is variation among learners in how they use apps, many learners are only using them to support a few strategies and therefore employing only a small proportion of the apps' functionality. There are two main possible and interrelated reasons here. Firstly, it is likely that learners rely on a limited number of mechanical strategies in general as demonstrated by [Wang \(1998\)](#) and [Shen \(2005\)](#). Secondly, they may not be aware of how easy it is to use other strategies with an app. For example, although the survey suggested that more than half of respondents used an app to identify the components of a character, none of the interviewees who were regular users of Pleco used it to do this. In fact, they tended to avoid this strategy in general, despite the fact that all of them stated that recognising radicals or components made it easier for them to learn a new character. The general consensus among interviewees was that they had avoided focusing too much on radicals because of the cognitive overload. The extent to which radicals should be a focus of CFL teaching and learning is controversial because of this issue, but as [Shen \(2005\)](#) argues, and the students in this study seem to believe, knowledge of radicals is likely to facilitate character learning. An electronic dictionary such as Pleco, which enables learners to identify all the components of a character with minimal extra mental effort (just one tap), may prove a valuable tool in this respect.

The interviewees in this study were just not aware of many of the functions of the apps they were using, probably because they are not immediately obvious to the user. Students therefore may require awareness-raising as well as training. [Grenfell and Harris \(2015\)](#) highlighted the need for strategy instruction for CFL learners and it is argued here that such instruction should include the use of apps. This requires that teachers are familiar with a range of apps so that they can provide the appropriate support. As [Kukulska-Hulme \(2009\)](#) suggests, “teachers and learners must try to work together to understand how portable, wireless technologies may best be used for learning” (p. 161).

Another reason for the limited use of some of the functions of Pleco is that they are paid add-ons and students admitted that they expected apps to be free. The

authors would argue that in the case of some paid-for apps, the potential for efficient learning is so great that teachers should help learners make informed purchasing decisions by demonstrating their functionality.

The findings suggest that there may be differential use of app-based strategies according to proficiency level, but conclusions cannot be drawn from the sample studied here. This could be an interesting and fruitful area for future research.

5. Conclusion

The results of this study indicate that mobile apps can play a significant role in supporting many students in their learning of Chinese characters. Pleco emerged as the most popular app for the CFL learners in this study, but most users exploited only a small proportion of its functionality, suggesting that learner training is required. Further research is needed to investigate a wider population of CFL learners and their use of apps, but also to explore the potential impact of learner training in the wider context of strategy-based instruction.

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Beyond the language classroom: researching MOOCs and other innovations

Edited by Kan Qian and Stephen Bax

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